Fjordr

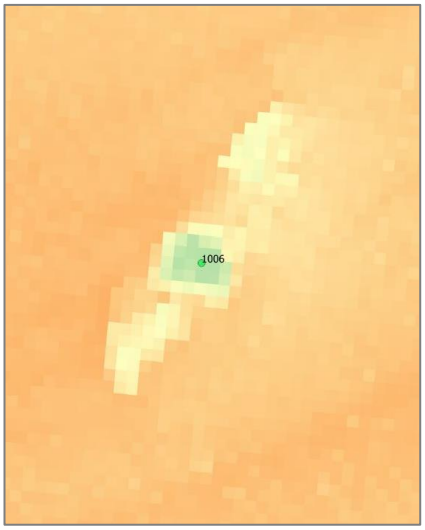
Marine and Historic Environment Consulting

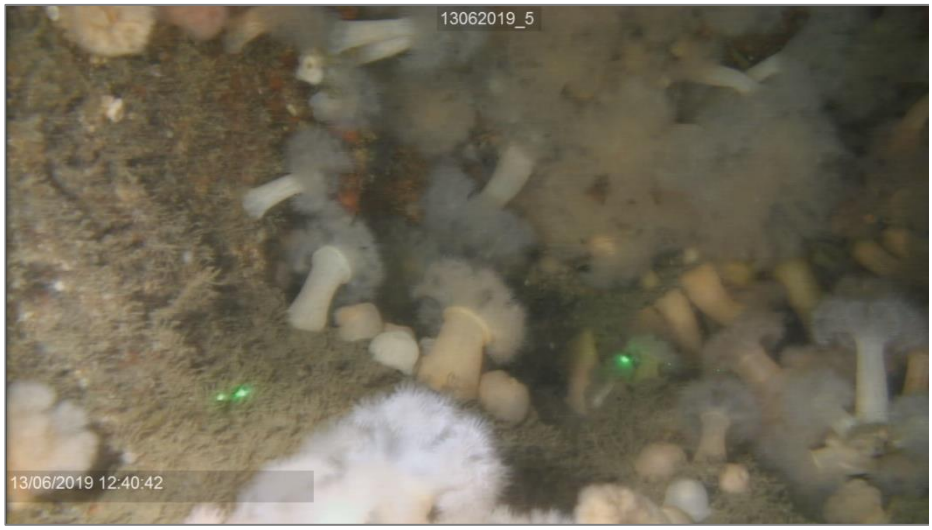
Isles of Scilly IFCA Collaboration

Integrating archaeological objectives with marine ecological surveys

Antony Firth

March 2020





A report for Historic England

Fjordr ref: 16500
Historic England ref: HE 7933

Title	**Isles of Scilly IFCA Collaboration** Integrating archaeological objectives with marine ecological surveys
HE Reference	**HE 7933**
Fjordr Ref / Version	16500
Authors	Antony Firth
Derivation	
Origination Date	02/03/20
Date of Last Revision	**23/03/20**
Summary of Changes	
Status / Required Action	Final report for Historic England
Circulation	Historic England
File Name / Location	Isles of Scilly IFCA Survey - Fjordr 230320

Cover images: CHP bathymetric data of wreck 1006 SS *Beechpark* (contains public sector information, licensed under OGL v3.0, from MCA) and frame from video showing the plumose anemone and turf community on the wreck (photo: University of Plymouth).

Contents

Figures

Acknowledgements

This document reports on a project commissioned by Historic England as part of Historic England's Heritage Protection Commissions programme. Fjordr is very grateful to Stuart Churchley, Mark Dunkley, Gareth Watkins (Project Assurance Officer) and to the staff of Historic England's Commissions team for enabling this project to take place. Serena Cant of Historic England kindly provided data from the National Record of the Historic Environment.

Fjordr is indebted to Tom Hooper and Ricky Pender of Isles of Scilly Inshore Fisheries and Conservation Authority (IFCA) for initiating the project, supporting its implementation and hosting Fjordr on the Isles of Scilly.

Many thanks also to the University of Plymouth team led by Emma Sheehan, including Amy Cartwright and Luke Holmes, Harry Thatcher and Bethany Reed who carried out the fieldwork. Bethany Reed also reviewed the video data and provided a summary of the species and habitats observed, together with supporting data. Thanks also to Stephanie Sturgeon of Cornwall IFCA for providing imagery from the sidescan survey.

Fieldwork was carried out from the fishing vessel *Kestrel*, skippered by Adam Morton, who deserves special credit for his skill in piloting the vessel and TUV onto its targets.

The project was carried out for Fjordr Limited by Dr Antony Firth, MCIfA.

Citation:

> Firth, A., 2020, 'Isles of Scilly IFCA Collaboration: integrating archaeological objectives with marine ecological surveys', unpublished report for Historic England. Project Number HE 7933; Fjordr Ref: 16500. Tisbury: Fjordr Limited.

Executive Summary

Isles of Scilly IFCA initiated this project by seeking to add an archaeological dimension to a habitat survey by the University of Plymouth planned for summer 2019. The initiative offered to further the relationship between IFCAs and archaeologists and resonated strongly with work for Historic England by Fjordr Limited on heritage and Natural Capital / Ecosystem Services. Historic wrecks appear to play a role as fish aggregators / nurseries / refuges, having an ecological importance individually and as networks of 'stepping stones' at regional scales. Initial discussion suggested that integration with anticipated survey methods – based around the use of a towed underwater video (TUV) – would be relatively straightforward and that the results would give impetus to several useful lines of development. The survey was planned in two areas: one to the north and one to the south and east of the Isles of Scilly, in water depths of 70-80m.

In preparation, Fjordr collated wreck data and reviewed bathymetric data in order to identify targets in and near to the survey area.

Unfortunately, adverse weather limited archaeological attendance during the survey to one day, 13th June 2019. However, three targets were successfully imaged: two bathymetric anomalies and one known wreck, the SS *Beechpark* torpedoed in 1917. The two bathymetric anomalies proved likely to be natural in origin. On the wreck of the SS *Beechpark*, key benthic species included plumose anemones, hydroids, elegant anemone, Devonshire cup coral, hydroid and bryozoan turf, dead man's fingers and encrusting sponges. A shoal of poor cod was recorded in the approach to the wreck. The habitat surrounding the wreck was sandy; key benthic species included burrowing anemone and sand mason worms and there were fragments of coal or coke from *Beechpark*'s cargo or bunkers. The University of Plymouth noted that in comparison to surrounding habitats, the presence of different benthic species indicated that the wreck provides a hard surface for species to colonise, increasing the structural complexity of the habitat which in turn provides essential habitat for larger vertebrates.

The data acquired and reviewed by the University of Plymouth using the TUV adds to the evidence for historic wrecks in UK waters providing distinct habitats that contribute to marine ecosystems from which multiple ecosystem services are derived. The project also successfully demonstrated the use of TUVs in obtaining imagery relating to the archaeological character of seabed features otherwise known only from geophysical or bathymetric data. The success of this trial is an important step towards more extensive interdisciplinary research that will help Isles of Scilly IFCA to achieve long-term sustainability of its local fisheries whilst conserving and enhancing the marine environment.

The project was carried out by Fjordr Limited on behalf of Historic England.

Isles of Scilly IFCA Collaboration

Integrating archaeological objectives with marine ecological surveys

HE 7933

Fjordr ref: 16500

1. Introduction

1.1. The initiative for this collaboration came from the Chief Fisheries and Conservation Officer for Isles of Scilly (IOS) IFCA (Inshore Fisheries and Conservation Authority)[1]. The initiative followed a presentation by Fjordr to the Association of IFCAs (A-IFCA) about the Understanding Fishermen's Fasteners project (HE 7171) on behalf of Sussex IFCA in March 2019. Having seen the results of the project with Sussex IFCA, IOS IFCA asked if there might be scope to add an archaeological dimension to survey work already being planned for summer 2019.

1.2. IFCAs are a form of local authority with responsibilities for the marine environment, including features of archaeological or historic interest in their areas (Marine and Coastal Access Act (MCAA) 2009 s. 186(1)). Although having separate statutory roles and responsibilities, IFCAs are closely linked to local government and their governing bodies include local authority Councillors. IOS IFCA's initiative offered to further the relationship between IFCAs and archaeologists, building on the earlier work with Sussex IFCA. The initiative also resonated strongly with work for Historic England on heritage and Natural Capital / Ecosystem Services (Firth 2020). The project was also likely to encourage awareness of heritage by local agencies and to help demonstrate the value of collaboration with the fishing sector, especially bearing in mind the presence of several designated marine heritage assets in the waters around Scilly[2].

1.3. Rather than looking at fasteners as with Sussex IFCA, discussions with IOS IFCA focussed on the value of carrying out ecological/fisheries surveys in the vicinity of wreck sites. Initial discussion suggested that integration with anticipated survey methods would be relatively straightforward and that the results would give impetus to several useful lines of development. In particular, there is a case for trying to raise awareness of the role that historic wreck sites play as fish aggregators / nurseries / refuges, as it seems from the literature that wrecks have an important ecological role individually and as networks of 'stepping stones' at regional scales (Firth 2018b; 2020). Very little work appears to have been done on this topic in the UK compared to Continental Europe, but if awareness could be raised then it might help bridge the gap between heritage and marine environmental management, research and policy development. Gathering data on the ecological value or Ecosystem Services of historic wrecks would start to address issues raised by the Tyne to Tees marine area case study on heritage and Natural Capital / Ecosystem Services project.

1.4. In terms of Historic England's Research Strategy, the proposed project was consistent with HE engagement with local and national government (Historic England 2016, para. 3.2). Specifically, the proposed project addressed the marine and maritime strand of the #understand theme of HE's

---

[1] (http://www.scillyifca.gov.uk/

[2] *Association* – https://historicengland.org.uk/listing/the-list/list-entry/1419276;
Bartholomew Ledges – https://historicengland.org.uk/listing/the-list/list-entry/1000066;
HMS *Colossus* – https://historicengland.org.uk/listing/the-list/list-entry/1000078;
Tearing Ledge – https://historicengland.org.uk/listing/the-list/list-entry/1000063.
Wheel Wreck – https://historicengland.org.uk/listing/the-list/list-entry/1000086;

Research Agenda, notably 'How can we maximise the use of survey and prospection data collected for … fishery projects to help us better understand our marine heritage?' (Historic England 2017, 12). The proposed project was also relevant to the measuring and sensing strand of the #innovate theme and broadly to the #value theme, in terms of how heritage assets such as wrecks sites give rise to environmental and economic value.

1.5. A research group from the University of Plymouth had been appointed by IOS IFCA to carry out the survey, which was to be directed at moderately deep water – around 80m – using a towed underwater video (TUV) and grab samples for habitat mapping. Cornwall IFCA were to undertake a geophysical (sidescan) survey in advance.

1.6. As the project was opportunistic – to make the most of a survey that was already planned – then the scope of archaeological involvement was necessarily limited. The project would centre on attendance by an archaeologist for four days – Monday 10th to Thursday 13th June 2019 – to include travel to and from the Isles of Scilly. Contingency was expected to include survey in sheltered, shallow water if the weather proved to be poor. In the event, the forecast for the period worsened sharply over the weekend of 8-9th June, which was too late to alter travel plans. Having arrived on Scilly, no fieldwork at all could take place on 11th-12th June but the return flight was delayed to enable attendance during the survey on Thursday 13th June.

2. Aim, Objectives and Tasks

2.1. The aim of the project was to further test the integration of archaeological objectives within third-party surveys and to generate data on the Ecosystem Services arising from marine heritage assets.

2.2. The objectives of the project were as follows:

- To test the integration of archaeological objectives within habitat survey for fisheries management purposes.
- To better understand the Ecosystem Services that arise from historic wreck sites as habitats.
- To build relationships with local authorities responsible for marine management.
- To raise awareness of the multiple facets of historic shipwrecks as features of the marine environment.

2.3. The principal archaeological tasks envisaged in the project proposal were as follows:

- Collate and review available wreck data in survey areas to identify suitable targets for IFCA survey, based on datasets from HE, Isles of Scilly HER, UKHO and Civil Hydrography Programme.
- Participate in survey to guide IFCA staff in obtaining data relevant to archaeological objectives.
- Prepare short factual report on methodological and archaeological implications.
- Accompany IFCA in meetings with local fisheries stakeholders and provide supporting outreach.

3. Methodology

3.1. Preparation

3.1.1. The survey was planned to take place within the IOS IFCA district, which extends up to six nautical miles from the baseline. Within the district, two survey areas had been identified for the survey: one to the north (c. 145 km^2); one to the south and east (c. 152km^2). Polygons of the survey areas were provided by IOS IFCA; these were forwarded to Historic England as the basis of a search of the National Record of the Historic Environment (NRHE).

3.1.2. The Isles of Scilly are well known for the hazards they present to shipping and for the numerous wrecks that have occurred around them. Shipwrecks around Scilly have been a focus for exploration since the early days of SCUBA in the UK; significant wrecks were discovered, but in some cases these discoveries were accompanied by uncontrolled recoveries and, indeed, conflicts between divers. The situation in the Isles of Scilly in the late 1960s and early 1970s contributed to the introduction of the Protection of Wrecks Act 1973. As noted above, several wrecks around Scilly are designated through this legislation. Interest in Isles of Scilly shipwrecks continues to be very strong and many wrecks are recorded and documented around its shores.

3.1.3. However, the majority of known wrecks – including the designated historic wrecks – are in relatively shallow waters between or close to the islands. Away from the islands, the seabed falls away over a short distance – often less than 1km – into depths of 60-70m. In the survey areas, the water is typically 70-80m deep. The key hazards to shipping of striking a reef or running ashore that have contributed significantly to the high number of wrecks immediately around Scilly do not apply in such depths (though there are still many hazards such as collision, foundering in heavy weather, enemy action, fire etc.). Moreover, the key means of discovering shipwrecks – intentionally or accidentally – are also less effective in these water depths: diving is much more highly constrained and features on the seabed are less likely to generate a noticeable trace, either on a depth sounder or as a fishing gear snag.

3.1.4. Consequently, the two survey areas returned only three recorded maritime sites from the NRHE: one in the north survey area (UID 881002; two in the south and east survey area (UID 881009; UID 881011). The shapefile of NRHE data was added to the project GIS, which was set up using QGIS[3]. A further 10 maritime sites were added to this list by reference to 'Wrecks within UK EEZ', which is a dataset made available by UKHO under Open Government Licence via the Admiralty marine data portal[4]. Reference was also made to Wrecksite, which is a commercial website that – on subscription – provides direct access to UKHO wreck records. The wrecks selected for addition to the list were all outside the survey areas but could prove suitable targets en route or at a relatively short additional distance. The complete list of wrecks flagged as potential targets – numbered 1001 to 1013 – is set out in Appendix I and their locations are marked on Figure 1. They do not reflect the overall number of wrecks around Scilly or their distribution.

3.1.5. In addition, publicly-available bathymetric data around Scilly were reviewed, both to confirm – where possible – the location of selected wrecks, and to identify localised topographic anomalies that might prove to be as-yet unrecorded wrecks. The bathymetric data reviewed as part of the project was acquired by multibeam survey through the Maritime and Coastguard Agency's Civil

[3] https://www.qgis.org/en/site/

[4] https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal/items/81bd2f58537d4be782efaa404c325261

Hydrography Programme (CHP); the data are made available through the Admiralty marine data portal[5]. The following datasets were downloaded and incorporated within the project GIS:

Year	CHP Survey Area / No.	Location	Gridded Resolution
2017	HI1505	West Scillies	8m
2017	HI1505	West Scillies	4m
2017	HI1504	South Scillies	4m
2016	HI1470	Eastern Approaches to Isles of Scilly	4m
2013	2015-019425	Isles of Scilly Bristows to the Stones rMCZ	2m

3.1.6. Multibeam data is acquired from the surface so water depth has a significant effect on its resolution. As the water is relatively deep, the resolution is quite low: it will be noted that the CHP datasets are offered at a gridded resolution of 2m-8m; i.e. the depth is presented as a single value for grid squares measuring 2x2m up to 8x8m. Within the survey areas, depths are presented as single values for a 4x4m grid square; while it is still possible to note anomalies at this resolution, the anomalies appear pixelated and it is not possible to resolve the fine detail that is typical of multibeam data for wreck sites in shallower water.

3.1.7. As already noted, the seabed around Scilly slopes steeply from around 30m to a generally flat plain at 70m+. When displayed using a typical colour ramp in GIS, this gross topography has the effect of masking features such as wrecks that might only be a few metres in height. Nonetheless, anomalies were identified in the survey areas from the bathymetric data, numbered 5001 to 5026, as marked in Figure 1. A further two anomalies – 5027 and 5028 – were numbered following initial discussion on the Isles of Scilly.

3.2. Survey

3.2.1. Survey of wreck sites / anomalies was planned for the week starting 10th June 2019, the University of Plymouth team having commenced the habitat survey in the previous week. As noted, the original intention was to mobilise to Scilly on Monday 10th in order to take part in surveys on Tuesday 11th and Wednesday 12th before returning from Scilly on Thursday 13th. In the event, all fieldwork was cancelled on Tuesday 11th and Wednesday 12th due to bad weather[6]. Travel arrangements were amended to return from Scilly on Friday 14th in order to take part in survey work on Thursday 13th. As well curtailing the time available during fieldwork, the bad weather also impacted the overall programme of the University of Plymouth team. Consequently, targets for Thursday 13th were selected to fit as much as possible with planned transects for the habitat survey, to enable some of these planned transects to be carried out in between the transects on wrecks/anomalies and to reduce the time spent steaming from location to location.

3.2.2. Three targets were chosen, all in the south east survey area 8-14km to the south of St Mary's: two anomalies, 5026 and 5003; and one known wreck, 1006. Bathymetric data for 5026 indicated a linear anomaly c. 100m x 20m with three distinct high spots which could possibly be a wreck with a 'three-island' layout (Fig. 3 top). Anomaly 5003 is a linear c. 40m x 12m oriented SW-NE also considered to be a possible wreck (Fig. 3 bottom, with 5004). The known wreck, 1006 (Fig 3, middle), is SS *Beechpark* (NRHE 859108; UKHO 21802; ADM 137/2962) of 4763 Gross Tons, which

[5] https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal

[6] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2019/2019_006_rainfall_lincolnshire.pdf

was torpedoed by a U-boat in August 1917 whilst carrying a cargo of coal and coke to Port Said from Newcastle. The UKHO records *Beechpark* as having a least depth of 84.2m in a general depth of 90m: length 110m; width 28m; height 5.8m. As such, *Beechpark* presented a substantial target despite the water depth.

3.2.3. The survey work was conducted by the University of Plymouth team of three people – with the additional support of one officer from IOS IFCA – from the small fishing vessel *Kestrel* (Fig. 4), skippered by its owner. One staff member from Fjordr was in attendance.

3.2.4. The equipment used for the habitat survey comprised a TUV equipped with a high definition camera, underwater lights and laser pointers to provide a scale (Fig. 5). The video is transmitted up the TUV's umbilical to a control unit in the wheelhouse (Fig. 6 top) where it can be viewed and recorded (Sheehan, Stevens, and Attrill 2010; Sheehan et al. 2016). Positioning was provided by handheld GPS. Target locations were also displayed with GPS positioning on a laptop to assist the skipper in piloting the vessel – and hence the TUV – in relation to the target.

3.2.5. The TUV is a tethered system with integral buoyancy, balanced to fly a short distance above the seabed. The system uses a drop weight from the vessel to provide the principal downline, to which the TUV is tethered. The drop weight is lifted off the seabed and the TUV itself is buoyant, so in normal operation the only direct impact on the seabed is from a chain trailing from the TUV that helps to maintain its height and attitude. The TUV is deployed over the side of the vessel (Fig. 6 bottom) and in this case was towed and recovered using *Kestrel*'s pot hauler immediately aft of the wheelhouse.

3.2.6. For the habitat survey, the TUV is towed on a straight transect at speeds of c. 0.25m/s (0.9 km/h or about 0.5 kt) for a timed period of 20 minutes; the resulting transect is typically 300m long. Whilst it is important to record the position of the transect to know where the data was obtained, the transect itself does not have to take place in an exact location because the habitats are generally quite extensive. In contrast, wrecks and anomalies are typically small, perhaps 50-100m long by 10-20m wide. Consequently, the TUV has to be piloted quite precisely, taking into account the influence of wind and tide on both the vessel and the long tether necessary in deep water. Although underwater visibility may be good, the water depth in the survey area was such that the natural light reaching the seabed is negligible, so visibility is governed by underwater lighting and is in any case restricted to looking straight ahead. The restricted visibility adds to the difficulty of piloting the TUV onto a small target, as it is possible to pass by the target only a few metres to the side and not see it. Having an archaeologist aboard with experience of shipwrecks and their characteristics on the seabed, and familiar with the bathymetry and positioning data, was of direct benefit.

3.2.7. Notwithstanding the difficulty of piloting the TUV onto highly localised seabed features, this was in fact achieved on all three targets. Three transects were conducted on anomaly 5026; two on wreck 1006 *Beechpark*; and one on anomaly 5003. The start and end of each transect is set out below, but it should be noted that – in contrast to the habitat survey transects – transects targeting wrecks/anomalies are not necessarily straight and are also much shorter.

Target	Transect	Start		Finish	
		Lat	Long	Lat	Long
5026	130619_1	49 50.319	-006 15.249	49 50.353	-006 15.228
	130619_2	49 50.315	-006 15.223	49 50.373	-006 15.163
	130619_3	49 50.305	-006 15.234	49 50.386	-006 15.167

1006	130619_4	49 47.549	-006 14.985	49 47.601	-006 14.886
	130619_5	49 49.475	-006 14.977	49 47.559	-006 14.878
5003	130619_10	49 51.314	-006 13.222	49 51.245	-006 13.222

(Transects _6, _7, _8 and _9 were habitat survey transects)

3.2.8. Bearing in mind that this was a new experience for all members of the crew, a certain amount of learning was necessary especially in judging the effective layback from the vessel GPS to the TUV near the seabed given the depth of water. Transects _1 and _2 were not definitely on anomaly 5026 though its presence was indicated by a cable on the seabed, which seems likely to be a result of a gear snag on a fastener. Transect _3 was definitely on a feature, though it proved to be a natural formation of large boulders rather than the wreck of a three-island steamer. Transect _5, which was the second transect on wreck 1006 *Beechpark*, certainly encountered the wreck: wreck material is visible in multiple images and fragments of coal from the cargo or bunkers are visible in images of the surrounding seabed. One transect was carried out on anomaly 5003; this transect also clearly encompassed an anomaly on the seabed though in this case it appeared to be broken rock. On balance, this was considered likely to be natural in origin rather than a cargo of stone or ballast.

3.2.9. In all three cases, the TUV provided imagery that could be used to help characterise seabed features apparent in multibeam data in terms of their cultural or natural origin. Building on the previous project with Sussex IFCA (Firth 2018a), the fact that three features were successfully imaged in a part-day of fieldwork in water depths of 80-90m indicates the cost-effectiveness of TUVs deployed from small vessels for gauging the archaeological potential of features such as fasteners and geophysical anomalies.

3.2.10. The University of Plymouth reviewed the video from selected transits using their standard methodology for TUV surveys; the results are summarised in Appendix II. On the wreck of the SS *Beechpark* (1006), key benthic species included plumose anemones, hydroids, elegant anemone, Devonshire cup coral, hydroid and bryozoan turf, dead man's fingers and encrusting sponges (Fig. 7-8). A shoal of poor cod was recorded in the approach to the wreck. The habitat surrounding the wreck is sandy with key benthic species including burrowing anemone and sand mason worms: 'black rocks' are likely to be fragments of coal or coke from *Beechpark*'s cargo or bunkers (Fig. 9).

3.2.11. The University of Plymouth noted that in comparison to surrounding habitats, the presence of different benthic species especially in transect 130619_5 on SS *Beechpark* indicates that the wreck provides a hard surface for species to colonise, increasing the structural complexity of the habitat. This faunal community gives rise to essential habitats for larger vertebrates such as the poor cod recorded in the vicinity.

4. Discussion and Conclusions

4.1. The data acquired and reviewed by the University of Plymouth using the TUV adds to the evidence for historic wrecks in UK waters providing distinct habitats that contribute to marine ecosystems from which multiple ecosystem services are derived. These services give rise to important social and economic benefits through commercial fishing, warranting IOS IFCA's interest in historic wrecks as potentially important features of the marine environment in their district. The habitats provided by historic shipwrecks may also be important for nature conservation and give rise to further ecosystem services through sea angling and recreational diving, for example.

4.2. Not least because of weather delays, the integrated survey provided numerous opportunities to discuss the interplay between cultural heritage and the natural environment in relation to commercial fishing and nature conservation. These discussions included not only IOS IFCA officers and marine ecologists from the University of Plymouth, but also visiting staff from Natural England; these discussions ranged from practical aspects of field research to the implications for marine management and policy. Whilst the survey was necessarily limited in its scope by the opportunity but also the impact of weather, the success of the fieldwork coupled with quite wide-ranging discussion provides a very good platform for further integrated research with direct application to marine management by IFCAs. Consequently, this project strongly complements previous work supported by Historic England and others (Firth et al. 2013; Firth 2018a; 2018b; 2020)

4.3. Specifically, this initial trial provides a basis for further work to look in more detail at the role of historic shipwrecks as habitats in relation to commercial fishing and other ecosystem services. IOS IFCA is keen to understand how key shellfish species using wrecks at different points in their life history – which is likely to include movement between wrecks and the surrounding seabed over fairly extensive areas. The array of mechanisms through which wrecks are preferential to fish and shellfish species – including the shelter they offer from certain forms of fishing activity – also warrants further consideration. In return, investigation of historic shipwrecks as habitats is likely to generate data on wreck condition and stability. Such information will enable greater understanding of the formation processes that have applied to (metal) wrecks since their loss and which will affect their future trajectory and management.

4.4. The project successfully demonstrated the use of TUVs in obtaining imagery relating to the archaeological character of seabed features otherwise known only from geophysical or bathymetric data. Although some adaptation and learning is required, equipment and methodologies developed for ecological survey can be used to meet archaeological objectives. Inspecting seabed features using TUVs is relatively quick, needs only a small, hired vessel and is effective even in deep water. Working with a skilled fisherman as a skipper – as well as having a diligent team – provides opportunities for sharing knowledge of the seabed and its features in the locality. The use of TUVs in other archaeological contexts – to check anomalies and fasteners revealed by strategic surveys or development-led work, for example – warrants further consideration.

4.5. The opportunistic circumstances of this project meant that it was not possible for archaeological considerations to inform plans for the sidescan survey by Cornwall IFCA in preparation for the TUV survey. In other circumstances, it would be advantageous for preparatory archaeological work on existing records and data sources to take place in advance of sidescan survey, so that survey lines can – where practical – be planned to encompass known wrecks and anomalies.

4.6. Moreover, there was no provision in this project for an archaeological geophysicist to review the sidescan data acquired by Cornwall IFCA. Again, in other circumstances it would be preferable to make provision for archaeological review of sidescan data alongside bathymetric data and other sources before the TUV survey takes place, in order to refine the selection of targets.

4.7. The project has reinforced earlier experience (Firth 2018a) demonstrating the archaeological value of CHP bathymetric data, contributing information about known wrecks (position; dimensions; orientation; broad character) but also serving as a means to identify anomalies that might prove to be previously unrecorded features.

4.8. Whilst the University of Plymouth were just able to accommodate the additional transects directed at wrecks and anomalies within their overall fieldwork programme, their resources for reviewing

the resulting video data were very limited. A summary of results from three transects was kindly provided; in future it would be strongly preferable for provision to be made for full analysis of all the transects directed at archaeological targets.

4.9. Nonetheless – and despite the impact of adverse weather – this small and opportunistic project was a great success. The integration of archaeological objectives within a habitat survey for fisheries management purposes was clearly demonstrated as a practical proposition, addressing joint interests relating to role of historic shipwrecks as habitats. The success of this trial is an important step towards more extensive interdisciplinary research that will help Isles of Scilly IFCA to achieve long-term sustainability of its local fisheries whilst conserving and enhancing the marine environment.

5. References

Firth, Antony. 2018a. 'Understanding Fishermen's Fasteners: A Report for Historic England on Behalf of Sussex IFCA'. Fjordr Ref: 16281/ Historic England Ref: 7171. Tisbury: Fjordr Limited.

———. 2018b. *Managing Shipwrecks*. London: Honor Frost Foundation. http://honorfrostfoundation.org/wp/wp-content/uploads/2018/07/Managing-Shipwrecks-April-2018-web.pdf.

———. 2020. 'Heritage, Natural Capital & Ecosystem Services: Case Studies on the Dorset Stour and Tyne to Tees Marine Area'. HE 7751/7752; Fjordr Ref: 16440/16450. Tisbury: Fjordr Limited.

Firth, Antony, Liam McAleese, Rohan Smith, and Tania Woodcock. 2013. 'Fishing and the Historic Environment'. EH 6204. Bath: Marine Ecological Surveys Ltd.

Historic England. 2016. *Research Strategy*. Swindon: Historic England. https://historicengland.org.uk/images-books/publications/research-strategy/research-strategy/.

———. 2017. *Research Agenda*. Swindon: Historic England. https://content.historicengland.org.uk/images-books/publications/he-research-agenda/research-agenda.pdf/.

Sheehan, Emma V., Timothy F. Stevens, and Martin J. Attrill. 2010. 'A Quantitative, Non-Destructive Methodology for Habitat Characterisation and Benthic Monitoring at Offshore Renewable Energy Developments'. Edited by Yan Ropert-Coudert. *PLoS ONE* 5 (12): e14461. https://doi.org/10.1371/journal.pone.0014461.

Sheehan, Emma V., Sandrine Vaz, Erin Pettifer, Nicola L. Foster, Sarah J. Nancollas, Sophie Cousens, Luke Holmes, Jean-Valery Facq, Gregory Germain, and Martin J. Attrill. 2016. 'An Experimental Comparison of Three Towed Underwater Video Systems Using Species Metrics, Benthic Impact and Performance'. Edited by John Reynolds. *Methods in Ecology and Evolution* 7 (7): 843–52. https://doi.org/10.1111/2041-210X.12540.

Appendix I: Selected Wrecks

ID	HE	UKHO	Name	Description	Location	CHP Survey Area	Depth	Lat (UKHO: DDM - WGS84)	Long (UKHO: DDM - WGS84)	NGR E (HE)	NGR N (HE)
1001	881011	15986	General Roberts	Welsh trawler, sunk 1906	Survey Area North	HI1470	78.2m in 81m; 2.5m scour	50 01.198	-006 21.445	088020	022450
1002		15998	Camiola (poss)	Sunk 1892; exam 2016	E of Seven Stones	HI1470	64.2m in 70m	50 03.284	-006 07.784		
1003		16157	Unknown	Bow of metal hulled sailing vessel, broken up and partially buried; Examined 2013	E of Seven Stones	HI1470	69.4 in 72m	50 04.748	-006 05.326		
1004		16158	Unknown	Steam drifter?; severely degraded wreck of medium sized vessel; exam 2016	E of Seven Stones	HI1470	67.8m in 71m	50 04.194	-006 07.415		
1005		16161	Unknown	Severely degraded remains of med-sized vessel; bow and stern upstanding with outline slightly visible; exam 2016	E of Seven Stones	HI1470	67.6m in 70m	50 03.184	-006 06.67		
1006		21802	Beechpark	Torpedoed 02 Aug 1917; examined 2016; severely degraded wreck of large vessel	South	HI1470	84.2m in 90m; height 5.8m	49 47.549	-006 14.951		
1007		21809	U-1208 (poss)	Sunk 24 Feb 1045; dived 2009; confirmed submarine	South East	NA	75m in 81m	49 51.820	-006 06.806		
1008		21852	Unknown	Wreck of a large vessel - 'coal boat'; examined 2016	Survey Area South East	HI1470	67.6m in 74m	49 54.898	-006 06.302		
1009		21864	Unknown	Exam 1976; not located by divers 2003	Crow Sound	HI1470	35m in 37m	49 55.816	-006 16.055		
1010		21865	St Vincent (poss)	Foundered 24 Apr 1882; dived 2005; wooden wreck buried in sand - iron winch 1m above sand	Crow Sound	NA	21m in 23m	49 56.064	-006 16.343		
1011		21894	Aksay	Steam ship sunk 2 Nov 1875; not located 2016	North of St Martins	HI1470	Stern in 72m , bow in 80m	49 59.110	-006 17.36		
1012	881009	21926	Unknown Feature	Obstruction; examined 2016 - 'does not appear to be a wreck'	Survey Area South East	HI1470	70.6m in 72m	49 56.603	-006 10.62	100450	013140
1013	881002	21932	Unknown Wreck	Obstruction; not located 2016	Survey Area South East	HI1470	64m in 73m	49 54.286	-006 09.364	101690	008790

Appendix II: Habitat Survey – Summary of Transects

(Bethany Reed, University of Plymouth)

Transect ID	Transect Start and End Points	Wreck Description	Surrounding Habitat Description
130619_1	49°50.319', -6°15.249' to 49°50.353', -6°15.228'	No wreck sighted but evidence in the form of a 'cable'. Species present include encrusting sponges, *Halecium* sp. (group of hydroids), *Ophiura albida* (small brittlestar), *Inachus* sp. (small spider crab) and *Pomatoceros lamarcki* (keel worm – although can't be sure they are alive without seeing the worm inside).	Surrounding habitat is rocky/mixed sediment. Key benthic species include *Lanice concheliga* (sand mason), hydroid species (*Nemertesia ramosa* and *Halecium sp.*), *Munida rugosa* (long-clawed squat lobster), *Pagurus* sp. (hermit crabs), turf (bryozoans and hydroids <1cm) and encrusting sponges. The only chordate in the vicinity recorded was *Scyliorhinus caniculus* (small-spotted catshark).
130619_2	49°50.315', -6°15.223' to 49°50.373', -6°15.163'	No wreck sighted but evidence in the form of a 'cable' but barely seen. Hard to identify fauna present due to being at the edge of the screen but appears in similar composition to the previous sighting.	Surrounding habitat is also similar, rocky/mixed sediment. Key benthic species include *Lanice concheliga* (sand mason), hydroid species (such as *Halecium* sp.), *Ophiocomina nigra* (black brittlestar), *Porania pulvillus* (red cushion starfish), turf (bryozoans and hydroids <1cm) and tuft bryozoans. The only chordate in the vicinity recorded was *Scyliorhinus caniculus* (small-spotted catshark).
130619_5	49°49.475', -6°14.977' to 49°47.559', -6°14.878'	Wreck sighted - see Figures 7-8. Key benthic species include *Metridium dianthus* (plumose anemones), hydroid species (such as *Nemertesia antennina* and *Nemertesia ramosa)*, *Sagartia elegans* (elegant anemone), *Caryophyllia smithii* (Devonshire cup coral), turf (bryozoans and hydroids <1cm), *Alcyonium digitatum* (dead man's fingers) and encrusting sponges.	Surrounding habitat is sandy with black rocks present (possibly cargo) (See Figure 9). Key benthic species include *Cerianthus lloydii* (burrowing anemone) and *Lanice conchilega* (sand mason). A shoal of *Trisopterus minutus* (poor cod) were recorded in the approach to the wreck.

The presence of different benthic species recorded on the wrecks compared to those in the surrounding habitats, especially in 130619_5, indicate these wrecks are providing a hard surface for species to colonise and so are increasing the structural complexity of the habitat. As this then builds a faunal community, it creates essential habitats for the larger chordates to be able to live in the area, such as the poor cod and catsharks recorded in the vicinity.

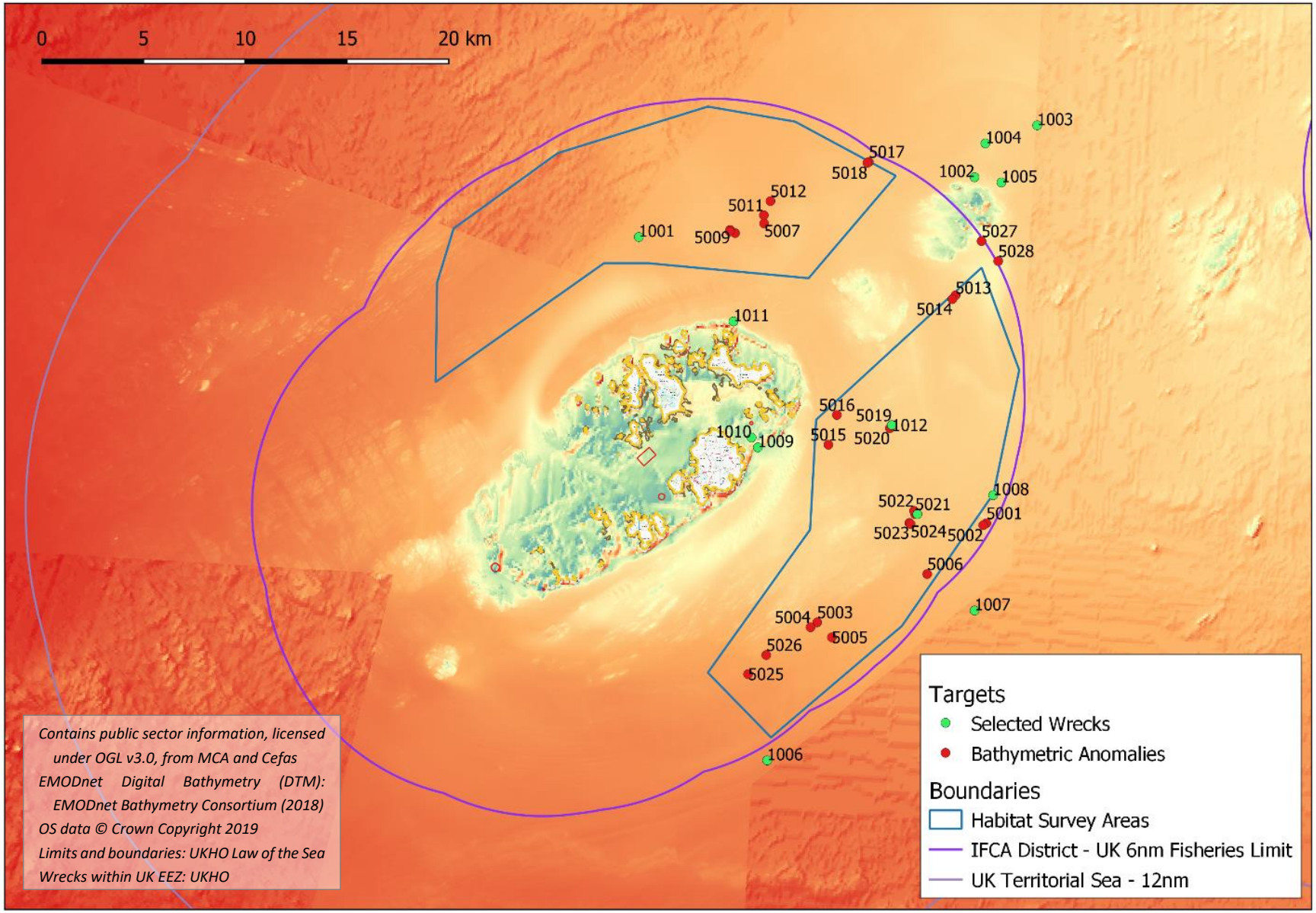


Figure 1. Isles of Scilly: bathymetry with selected wrecks and anomalies.

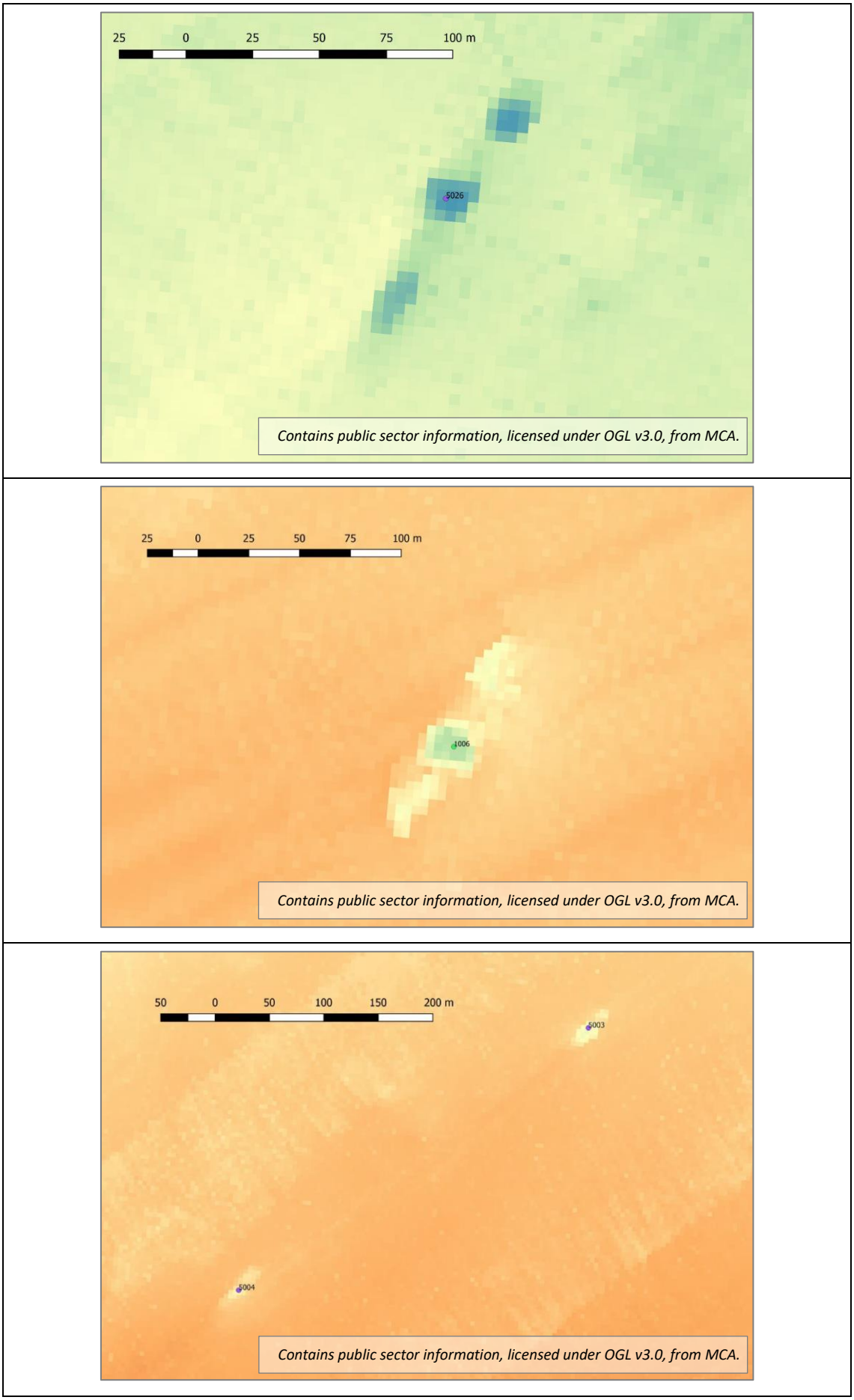


Figure 2. CHP multibeam data of bathymetric anomalies 5026 (top) and 5003 (with 5004, bottom), and selected wreck 1006 (middle).

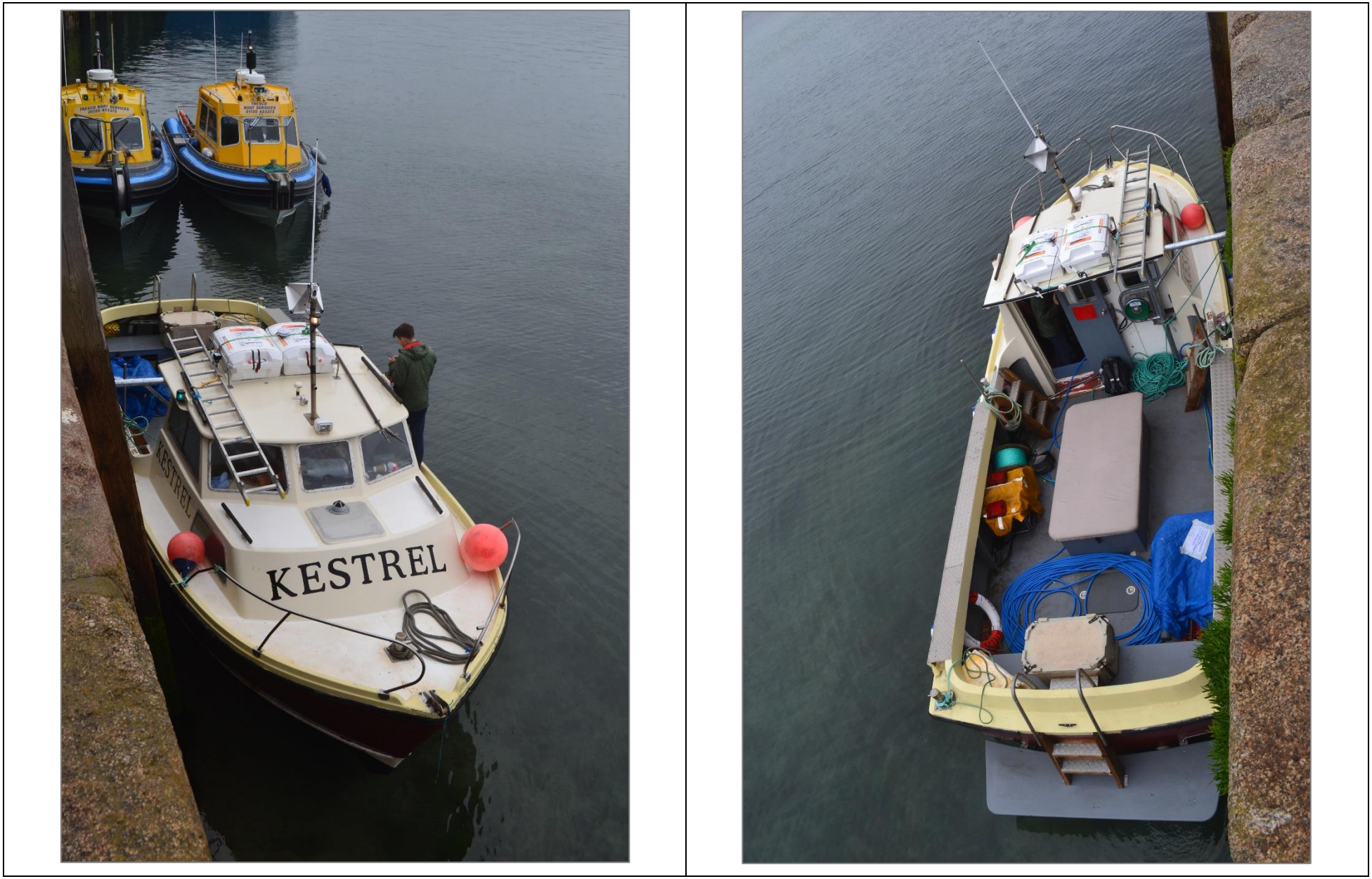


Figure 3. Fishing vessel *Kestrel*.

Figure 4. Left: TUV showing buoyancy tubes. Top right: Camera, lights and lasers on TUV.
Bottom right: TUV deployment underwater (photo: University of Plymouth).

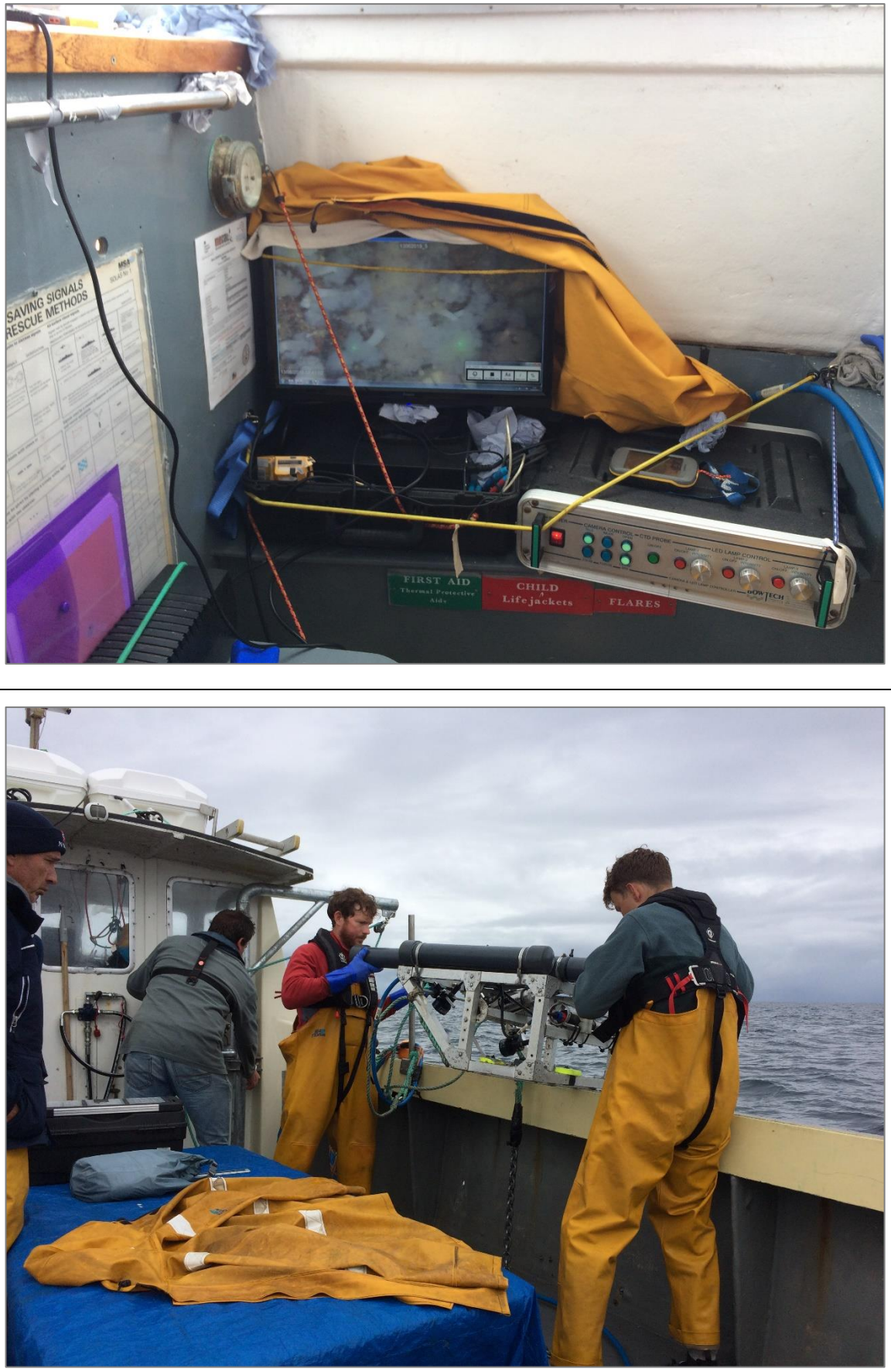
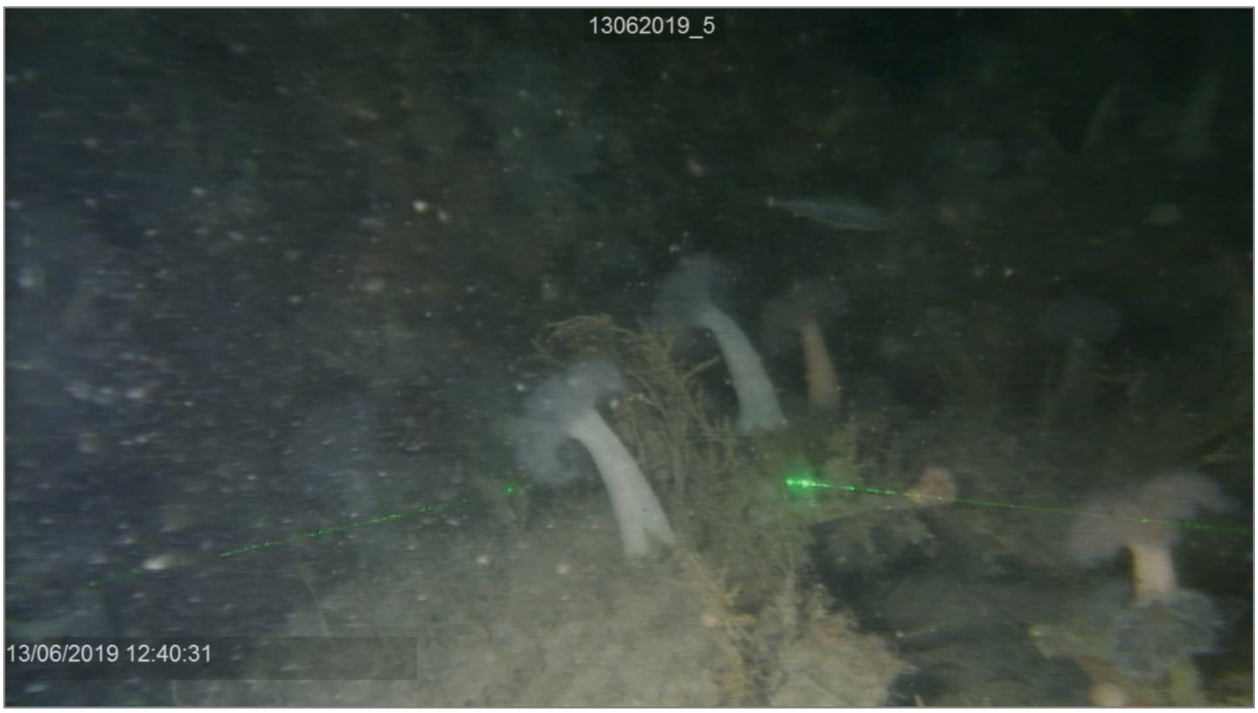


Figure 5. Top: TUV control unit in wheelhouse. Bottom: Deployment of TUV over the side.



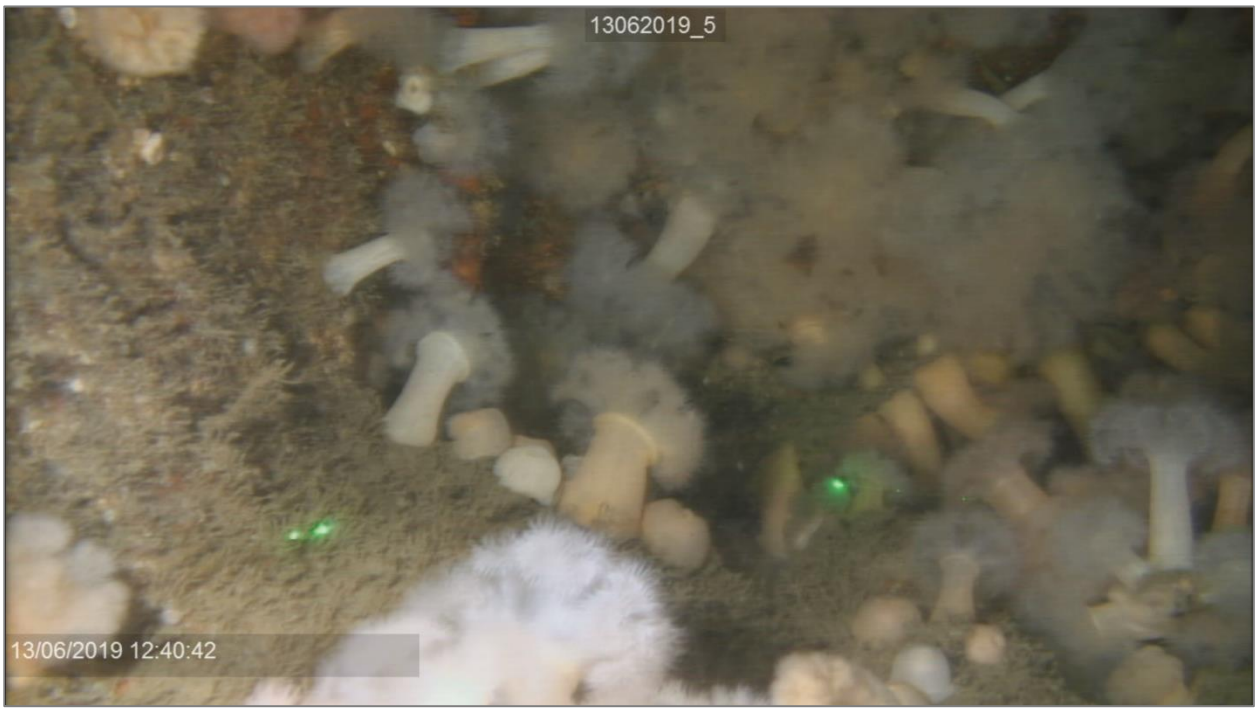


Figure 6. Top: Frame from 130619_5 showing first sighting of wreck. Bottom: Frame from 130619_5 showing the plumose anemone and turf community on the wreck. (Captions and photos: University of Plymouth).

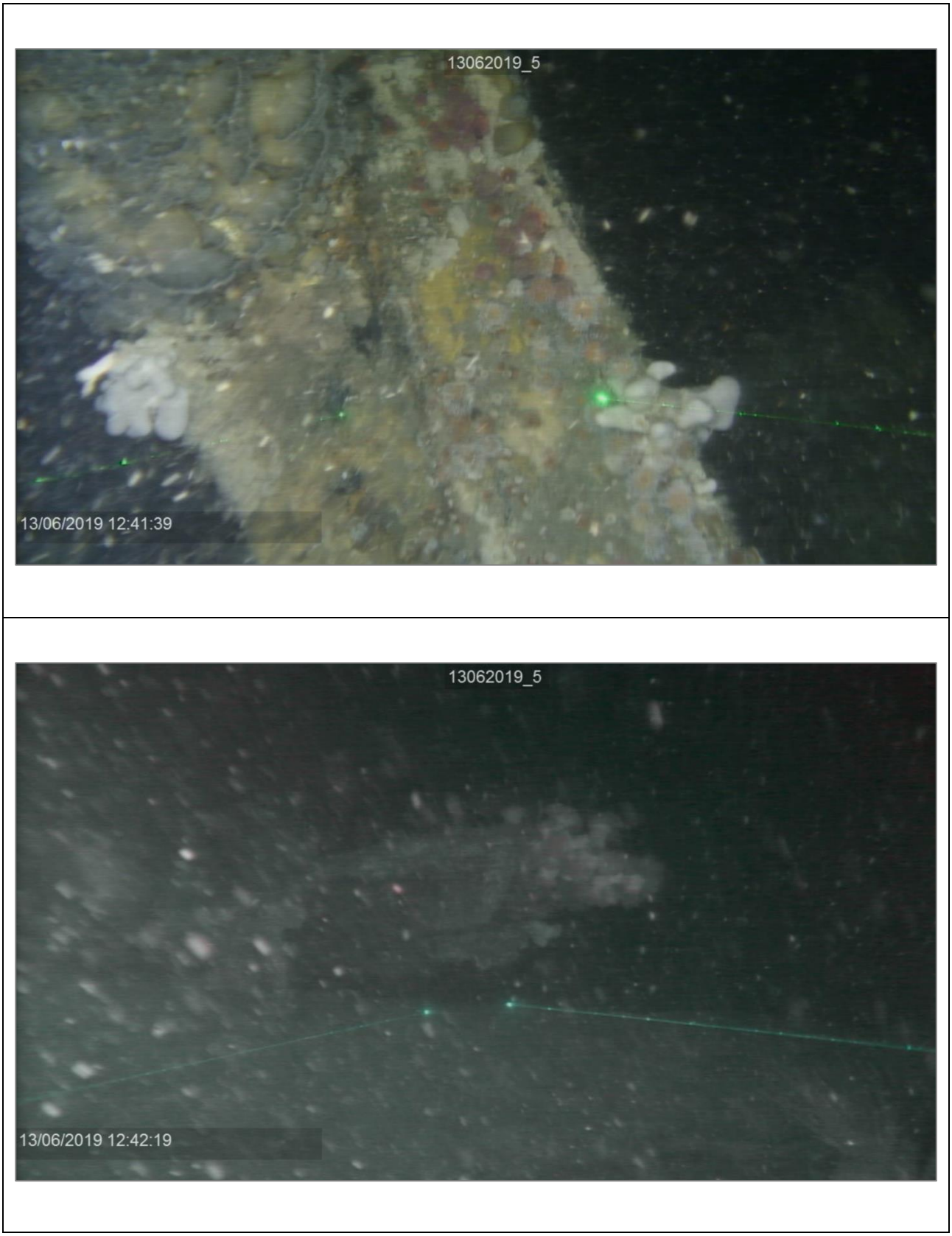


Figure 7. Top: Frame from 130619_5showing confirmation of wreck due to non-natural formation; as well as the elegant anemone, encrusting sponge, plumose anemone and dead man's fingers community on the wreck. Bottom: Frame from 130619_5 showing feature of the wreck which further confirms non-natural formation. (Captions and photos: University of Plymouth).

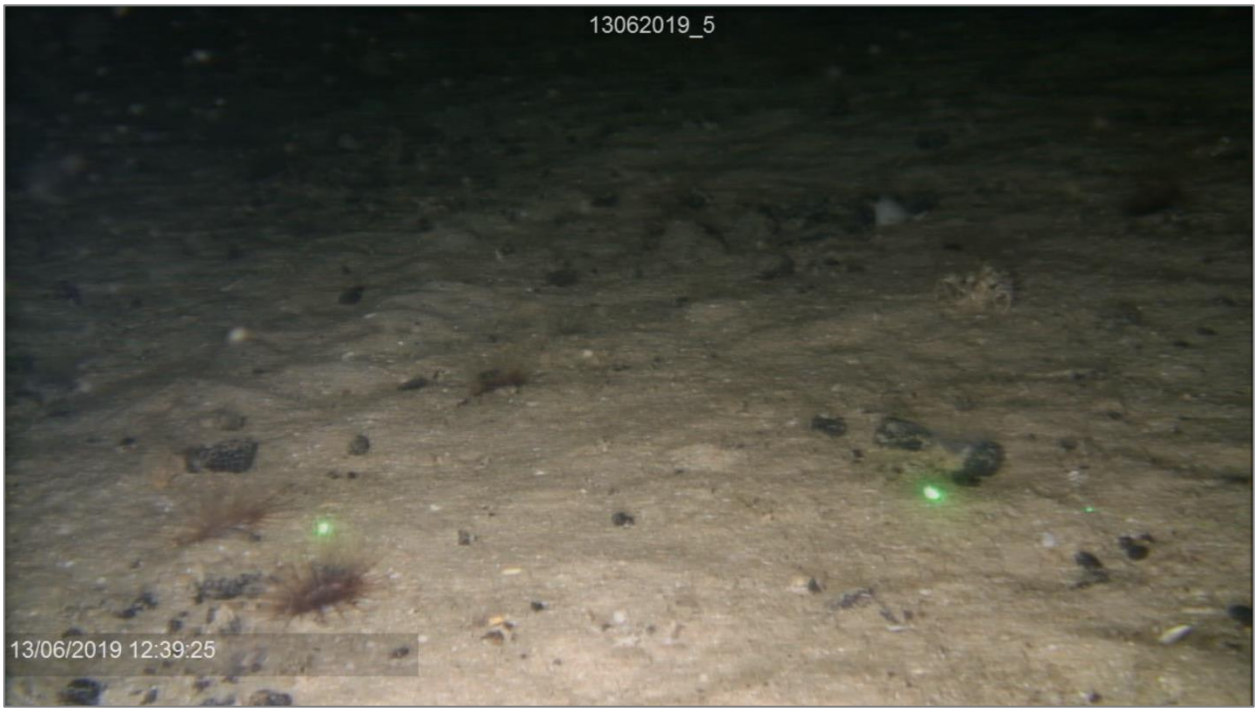


Figure 8. Frame from 130619_5 showing surrounding habitat type and black rocks (possible cargo). (Captions and photos: University of Plymouth).

Fjordr Limited
Post Office House
High Street, Tisbury
SP3 6LD, UK

email: info@fjordr.com
telephone: +44 (0) 1747 871919